

What is claimed is:

- 1 1. A composition comprising an erbium metal precursor, an ion forming
2 activator and, either a group 13 reagent, divalent metal reagent or alkali metal reagent.
- 1 2. A composition comprising an erbium metal precursor, an ion forming
2 activator, at least one ligand and, optionally, either a group 13 reagent, divalent metal
3 reagent or alkali metal reagent.
- 1 3. A composition comprising an erbium metal precursor represented by the
2 general formula ErR_3 , where each R is $\text{CH}(\text{Si}(\text{CH}_3)_3)_2$.
- 3 4. A composition comprising an erbium metal precursor represented by the
4 general formula ErR_3 , where each R is $\text{OC}_6\text{H}_{3-2,6-t}\text{Bu}_2$.
- 1 5. The composition of claim 2, wherein said at least one ligand has a
2 coordination site selected from the group consisting of 1, 2, 3 or 4, and a charge of 0,
3 -1, -2 or -3.
- 1 6. The composition of claim 2, wherein said at least one ligand is characterized
2 by the formula:
3 $\{(a,0)_i (b,c)_j\}$
4 where a is an integer from 1-4, b is an integer from 1-4, c is -1 or -2, i is an integer
5 from 0-5 and j is 0, 1 or 2, provided that the sum of i + j is greater than or equal to 1
6 and provided that when c is -1, j is 1 or 2 and when c is -2, j is 1 and, (a,0) represents
7 neutral ligands that may be provided by one or more atoms with a lone pair of
8 electrons or bonds and (b,c) represents charged ligands and may be provided by one
9 or more atoms or bonds.
- 1 7. A composition comprising an erbium metal complex represented by the
2 general formula:
3 $\{(a,0)_i (b,c)_j\} \text{ErR}_{3+(jc)}$
4 where a is an integer from 1-4; b is an integer from 1-4; c is -1 or -2; i is an integer
5 from 0-5; j is 0, 1 or 2; and jc is the product of j times c, and provided that the sum of

6 i + j is greater than or equal to 1, provided that either a or b is greater than 1, and
7 provided that when c is -1, j is 1 or 2 and when c is -2, j is 1, (a,0) represents neutral
8 ligands that may be provided by one or more atoms with a lone pair of electrons or
9 bonds and (b,c) represents charged ligands and may be provided by one or more
10 atoms or bonds; and each R group may independently be selected from the group
11 consisting of alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl,
12 heterocycloalkyl, substituted heterocycloalkyl, aryl, substituted aryl, heteroaryl,
13 substituted heteroaryl; provided that the erbium does not have two cyclopentadienyls
14 or three 2-dialkylaminobenzyls or three 2-dialkylaminomethylphenyls or an acetylide
15 or three phosphorus substituted alkyls.

1 8. A composition comprising an erbium metal complex represented by the
2 general formula:

$$[\{(a,0)_i (b,c)_j\} ErR_{3+(jc)-w}]^w$$

3 where w is a integer that is -3, -2, -1, 1, or 2 and a is an integer from 1-4; b is an
4 integer from 1-4; c is -1 or -2; i is an integer from 0-5; j is 0, 1 or 2; and jc is the
5 product of j times c, and provided that the sum of i + j is greater than or equal to 1,
6 provided that either a or b is greater than 1, and provided that when c is -1, j is 1 or 2
7 and when c is -2, j is 1, (a,0) represents neutral ligands that may be provided by one or
8 more atoms with a lone pair of electrons or bonds and (b,c) represents charged ligands
9 and may be provided by one or more atoms or bonds; and each R group may
10 independently be selected from the group consisting of alkyl, substituted alkyl,
11 cycloalkyl, substituted cycloalkyl, heterocycloalkyl, substituted heterocycloalkyl,
12 aryl, substituted aryl, heteroaryl, substituted heteroaryl; provided that the erbium does
13 not have two cyclopentadienyls.
14

1 9. An array of compounds or complexes wherein each array member is different
2 from the others, and there are at least 8 compounds or complexes in the array, wherein
3 each of the compounds or complex is an erbium metal precursor.

1 10. The array of claim 9, wherein each compound additionally comprises at least
2 one ligand.

- 1 11. An array of compositions wherein there are at least 8 compositions in the array
- 2 and each composition being different from the others and at least one of said
- 3 compositions being defined as in either of claims 1, 2, 3, 4, 5, 6, 7 or 8.

100 90 80 70 60 50 40 30 20 10